CLAIMS

1. Process for continuously producing chlorine dioxide comprising the steps of:
feeding chlorate ions, acid and hydrogen peroxide as aqueous solutions to a reactor;
reducing chlorate ions in the reactor to chlorine dioxide, thereby forming a product stream in the reactor containing chlorine dioxide;
feeding motive water to an eductor comprising a nozzle;
bringing the motive water to flow through the nozzle and causing it to flow further through the eductor in an at least partially spiral or helical manner;
transferring the product stream from the reactor to the eductor and mixing it with the motive water and thereby forming a diluted aqueous solution containing chlorine dioxide, and;
withdrawing the diluted aqueous solution containing chlorine dioxide from the eductor.

2. Process as claimed in claim 1, wherein the motive water is caused to flow further through the eductor in a substantially spiral or helical manner.

3. Process as claimed in claim 1, wherein motive water is brought to flow in an at least partial spiral or helical manner by means of twisted vanes arranged inside or upstream the nozzle in the eductor.

4. Process as claimed in claim 1, wherein motive water is brought to flow in an at least partial spiral or helical manner by means of internal rifling inside or upstream the nozzle in the eductor.

5. Process as claimed in claim 1, wherein the eductor further comprises, in the flow direction from the nozzle, a suction chamber, into which the product stream is transferred from the reactor, and a venturi section, through which the diluted aqueous solution containing chlorine dioxide is withdrawn.

6. Process as claimed in claim 1, wherein the chlorate ions are fed to the reactor as an aqueous solution comprising a metal chlorate and the acid is fed to the reactor as mineral acid.

7. Process as claimed in claim 6, wherein the mineral acid is sulfuric acid.

8. Process as claimed in claim 6, wherein alkali metal chlorate and hydrogen peroxide are fed to the reactor in the form of a premixed aqueous solution.

9. Process as claimed in claim 8, wherein the premixed aqueous solution comprises from about 1 to about 6.5 moles/liter of alkali metal chlorate, from about 1 to about 7 moles/liter, of hydrogen peroxide, at least one of a protective colloid, a radical scavenger or a phosphonic acid based complexing agent, and having a pH from about 0.5 to about 4.

10. Process as claimed in claim 1, wherein molar ratio H_2O_2 to ClO_3^- fed to the reactor is from about 0.2:1 to about 2:1.

11. Process as claimed in claim 1, wherein the amount of chloride ions fed to the reactor is below about 1 mole % Cl^- of the ClO_3^-.

12. Process as claimed in claim 1, wherein the product stream in the reactor containing chlorine dioxide comprises liquid and foam.

13. Process as claimed in claim 1, wherein the temperature within the reactor is maintained from about 30 to about 60°C.

14. Process as claimed in claim 1, wherein an absolute pressure from about 30 to about 100 kPa is maintained within the reactor.

15. Process as claimed in claim 1, wherein the reactor is a substantially tubular through-flow vessel or pipe.

16. Process as claimed in claim 15, wherein the reactor is arranged substantially vertically.

17. Process as claimed in claim 15, wherein the reactor comprise a disk or the like provided with apertures and arranged inside the reactor, and metal chlorate and hydrogen peroxide are fed downstream of the disk, while an acid is fed upstream of the disk and brought to flow through the apertures and then mix with the metal chlorate and the hydrogen peroxide.

18. Process as claimed in claim 16, wherein the main flow direction is upwards.

19. Process for continuously producing chlorine dioxide comprising the steps of:

feeding to a reactor sulfuric acid and a premixed aqueous solution comprising alkali metal chlorate and hydrogen peroxide in a molar ratio H_2O_2 to ClO_3^- from about 0.5:1 to about 1.5:1;

maintaining in the reactor a temperature from about 30 to about 60°C and an absolute pressure from about 30 to about 100 kPa;

reducing chlorate ions in the reactor to chlorine dioxide, thereby forming a product stream in the reactor containing chlorine dioxide;

feeding motive water to an eductor comprising a nozzle, a suction chamber and a venturi section;

bringing the motive water to flow through the nozzle and causing it to flow further through the suction chamber and the venturi section in an at least partially spiral or helical manner by means of twisted vanes arranged inside or upstream the nozzle;

transferring the product stream from the reactor to the mixing chamber and mixing it with the motive water and thereby forming a diluted aqueous solution containing chlorine dioxide, and;

withdrawing the diluted aqueous solution containing chlorine dioxide from the eductor through the venturi section.

20. Apparatus for producing chlorine dioxide according to any one of the claims 1-19, comprising a reactor provided with feed lines for chlorate ions, hydrogen peroxide and acid, the reactor being connected to an eductor provided with a nozzle for motive water and means for causing the motive water to flow further through the eductor in an at least partially spiral or helical manner.